Remarks

Reconsideration of rejected claims 1-17 is respectfully requested.

In the Office action dated April 10, 2003 (application Paper No. 14), the Examiner rejected various combination of claims under 35 USC § 103(a). The Examiner's rejections will be addressed below in the order appearing in the Office action.

Drawings

The Examiner stated that the proposed drawing correction has been accepted. Therefore, applicants are filing a "formal" sheet of revised drawings with this response.

35 USC 103(a) Rejection – Claims 1, 2, 4, 6, 11, 13, 14 and 17

The Examiner first rejected claims 1, 2, 4, 6, 11, 13, 14 and 17 under 35 USC 103(a) as being unpatentable over US Patent 6,433,411 (Degani) in view of US Patent 5,952,712 (Ikuina) and JP Patent 09261975 (Higuchi). The Examiner cited Degani as teaching "an array ... of electrostatically activated members ... formed on a layer comprising silicon". Ikuina was cited by the Examiner as teaching "the use of conductors (17) on a ceramic substrate (12) with via holes (15) in the substrate and the substrate connected to a silicon layer(11)". The Higuchi reference was then cited by the Examiner as teaching "the use of conductors formed on a major surface". The Examiner then concluded that "it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the through hole electrostatic actuator [of Ikuina] and the conductors on the major surface of the substrate taught by Higuchi in the Degani invention for the purpose of creating a more electrically isolated environment around the micromirrors".

In response, applicants assert that the combination of Degani, Ikuina and Higuchi cannot be found to disclose or suggest the inventive device as defined by independent claims 1 and 13 (or the other cited dependent claims). There is no teaching in Ikuina of utilizing "a substrate comprising a ceramic material" as the support substrate for <u>all</u> of the electrical connections for controlling an array of electrostatically activated members.

Referring to both the text and drawings of Ikuina, it is clear that a "combination" of a ceramic multilayer substrate and silicon layer and joined, with an electrode structure then using a via that is formed through the "combination" of the ceramic and silicon layers. The Examiner is referred to FIG. 1 of Ikuina, which clearly shows a via 15 as formed through both ceramic layer 12 and silicon layer 11, with a first electrode 16 formed on the ceramic 12 and a second electrode 14 formed on silicon 11. In contrast, and as discussed throughout the specification and defined in the rejected claims, an object of the present invention is to *remove* the need to form any conductors whatsoever on the silicon layer containing the electrostatically activated members. Ikuina does not illustrate such a structure. Therefore, the combination of Degani, Ikuina and Higuchi cannot be found to disclose or suggest the structure of the present invention as defined by the rejected claims. Applicants therefore respectfully request the Examiner to reconsider this rejection and find the cited claims to be in condition for allowance.

35 USC § 103(a) Rejection – Claim 3

The Examiner next rejected claim 3 under 35 USC 103(a) as being unpatentable over Degani in view of Ikuina and Higuchi (as applied to claim 2, above), in further view of an article entitled *"Free-Space Micromachined Optical Switches for Optical Networking"* (Lin). The Lin reference was used by the Examiner specifically cite the formation of a "bigger" MEMS array (an 8x10 array). Regardless of the teaching of Lin, applicants assert that the combination still lacks any teaching regarding the use of a first element (a silicon layer) to form the actual MEMS array and a second, *separate* element (a ceramic substrate) to form the electronics for controlling the MEMS array. Again, the cited Ikuina reference discloses an arrangement where the electrodes are formed through a combination of both the ceramic and silicon layers. The present invention does not contemplate or desire such an arrangement. Without this teaching of maintaining separate layers with the electronics totally formed on the ceramic substrate, applicants assert that the cited combination cannot be found to render obvious the teaching of claim 3, which ultimately depends from claim 1 (discussed above). Applicants therefore respectfully request the Examiner to reconsider this rejection and find claim 3 to be in condition for allowance.

35 USC § 103(a) Rejection – Claim 5

Claim 5 was next rejected by the Examiner under 35 USC 103(a) as being unpatentable over Degani, Ikuina and Higuchi (as above, applied to claim 1), in further view of US Patent 6,393,187 (Engleberth). The Engleberth reference was cited by the Examiner as teaching the use of a metal layer deposited on a silicon layer. However, the Engleberth reference is not germane to the subject matter of MEMS technology, but to an optical fiber-based free space optical switch. Regardless of the subject matter of Engleberth, however, it is asserted that the combination of Engleberth with Degani, Ikuina and Higuchi still lacks any teaching of using a separate silicon layer and ceramic substrate, as defined by claim 5 (based on independent claim 1). Applicants therefore respectfully request the Examiner to reconsider this rejection and find claim 5 to be in condition for allowance.

35 USC § 103(a) Rejection – Claims 7 and 9

Claims 7 and 9 were next rejected by the Examiner under 35 USC 103(a) as being unpatentable over Degani in view of Ikuina and Higuchi (as applied to claim 1), in further view of the article *"Thin Film Metallization for Aluminum Nitride"* (Imanaka). Imanaka is cited for its teaching of the properties of a ceramic material (in particular, for the use of aluminum nitride and issues regarding its roughness). However, the combination of Imanaka with Degani, Ikuina and Higuchi still lacks any teaching of using separate silicon and ceramic members for the optic and electronic portions of a MEMS device, as defined by independent claim 1, from which both claims 7 and 9 depend. Applicants thus respectfully request the Examiner to reconsider this rejection and find claims 7 and 9 to be in condition for allowance.

35 USC § 103(a) Rejection – Claim 8

The Examiner next rejected claim 8 under 35 USC 103(a) as being unpatentable over Degani in view of Ikuina and Higuchi (as applied to claim 1), in further view of Lin (as above). The Examiner particularly cited Lin as teaching the use of a substrate with a flatness less than 10 microns (particularly, Lin teachings a flatness of 0.5 microns).

Regardless of the teaching of Lin, applicants assert that the combination still lacks any teaching regarding the use of a first element (a silicon layer) to form the actual MEMS array and a second element (a ceramic substrate) to form the electronics for controlling the MEMS array. Without this teaching, applicants assert that the cited combination cannot be found to render obvious the teaching of claim 8, which ultimately depends from claim 1(discussed above). Applicants therefore respectfully request the Examiner to reconsider this rejection and find claim 8 to be in condition for allowance.

35 USC § 103(a) Rejection – Claim 10

The Examiner next rejected claim 10 under 35 USC 103(a) as being unpatentable over Degani in view of Ikuina and Higuchi (as applied to claim 1), in further view of US Patent 6,329,607 (Fjelstad) and US Patent 6,284,656 (Farrar). The Fjelstad and Farrar references were cited by the Examiner as teaching particular line width and spacing requirements for conductors in microelectronic structures. However, this combination still lacks any teaching of utilizing separate substrates for MEMS devices and their associated conductors, as required by rejected independent claim 1, from which claim 10 depends. Applicants thus respectfully request the Examiner to reconsider this rejection and find claim 10 to be in condition for allowance.

35 USC § 103(a) Rejection – Claim 12

Independent claim 12 was rejected by the Examiner under 35 USC § 103(a) as being unpatentable over Degani, in view of Ikuina, Higuchi, Lin and Imanaka, for all of the reasons discussed above in association with the rejection of the previous claims. In light of the lack of teaching in Ikuina regarding the use of a separate ceramic substrate to provide and support all of the "conductors" that are "positioned so as to selectively operate the array of mirrors" as defined by claim 12, applicants assert that this combination of references cannot be found to render obvious the subject matter of claim 12. It is therefore respectfully requested that the Examiner reconsider this rejection and find claim 12 to be allowable over the cited combination.

35 USC § 103(a) Rejection – Claims 15 and 16

Lastly, the Examiner rejected claims 15 and 16 under 35 USC 103(a) as being unpatentable over Degani in view of Ikuina and Higuchi (as applied to claim 13, above), in further view of US Patent 5,995,688 (Aksyuk). The Aksyuk reference was cited by the Examiner as teaching bonding of a MEMS substrate to a SiOB substrate. However, there is no teaching in Aksyuk of bonding a silicon layer (supporting MEMS devices) to a *ceramic* substrate supporting MEMS electronics. Applicants thus assert that the combination of Aksyuk with Degani, Ikuina and Higuchi cannot be found to render obvious the subject matter of the present invention as defined by claims 15 and 16.

Applicants believe that with the above-cited amendments to certain claims, the application, in its present form, is in condition for allowance. Applicants thus respectfully request the Examiner to reconsider the objections and rejections, and find claims 1-17 ready to issue. If for some reason or other the Examiner does not agree that the case is ready to issue and that an interview or telephone conversation would further the prosecution, the Examiner is requested to contact applicants' attorney at the telephone number listed below.

Respectfully submitted,

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